

# Alternative Reflections on Podkletnov's Gravity Experiments

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**Abstract:** In the 1990s Eugene Podkletnov published results of experiments which in his opinion proved the effect of gravity shielding. The present paper is concerned with the question, what results may be expected from such experiments on the basis of the "Alternative Reflections on Gravitation", (ARG). The results of these considerations are in excellent agreement with those experiments. There, however, appeared no gravity shielding, but the production of additional, highly focused repulsive forces. Such curious results can hardly be explained on the basis of classical gravitational theories, which deal with attractive forces and their strong decrease with distance.

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## 1 Introduction

If reports in physics about new experiments or new theoretical concepts, which severely contravene well established knowledge, are presented, they hardly have a chance to be accepted for publication in refereed journals. This paper deals with just two of such reports. The first one is concerned with experiments, performed by Eugene Podkletnov (E. P.), who reported his results about gravity shielding by rotating superconducting disks <sup>[1]</sup>. The second report is concerned with "Alternative Reflections on Gravitation", (ARG), which were developed by the author of the present paper (J. A.) <sup>[2], [3]</sup>. Until now there was never established a connection between these two projects, although their historical developments during the last quarter of a century since about 1990 show many parallels. In the next chapter of this paper the main results of Podkletnov's experiments in Tampere are listed. Chapter 3 deals with E. G.'s investigations with his "Impulse Gravity-Generator". In the following three chapters 4 to 6 the expectations on the basis of the ARG of such experiments are explained. It turns out, that there exists an astonishingly high compatibility between the experimental findings of E. P. and the Alternative Reflections on Gravitation (ARG) of J. A., which both are obviously considered as obscure in the physics community.

## 2 Podkletnov's tampere-experiments

In 1992 E. P. published a paper in Physica C <sup>[4]</sup> where he reported his results about gravity shielding by rotating superconducting disks. This paper was later withdrawn by himself. The reason seems to be the fact that he was not able to reproducibly retry his experiments, as it could be expected from a shielding effect of Earth gravity. Later, in 1996, another paper was announced to appear in Physics D. However, it never appeared <sup>[5]</sup>. Meanwhile, however, there exist several sources, interviews and videos, which provide more details concerning E. G.'s experiments in Tampere. Many special details, from all these different sources, may be mentioned in the following.

1 The experiment used different types of magnetic fields, static and alternating ones, for levitating and rotational acceleration of the superconducting disk <sup>[1]</sup>.

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2 The experiments showed the loss of weight of a test mass  $m$ , located above the rotating disk. The effect was assumed to be due to gravitational shielding.

3 If under similar conditions the test mass  $m$  was placed below the disk, there occurred no weight change.

4 The effect was like that of a beam of repulsive mechanical forces. This beam could be observed even in the floor above the experiment, with similar profile and almost no divergence.

5 Later it was reported, that not only a weight decrease but also a weight increase of  $m$  could be observed. Thus, his experiment could "demonstrate both repulsive and attractive forces" [6].

6 Therefore, E. P. later preferred to use terms like "gravity modification" or "modification of local gravity fields" [6], instead of "gravity shielding".

7 The percentage of weight loss was independent of the type of material.

8 The weight loss of about 2% could be doubled if one device was suspended over another [7].

9 The discovery of the gravitational effect was quite accidental. Late in the evening the smoke from the pipe of a colleague went straight upward when approaching the rotating disk [6].

10 Later E. G. told another interesting detail: "But to be absolutely honest, after 12 or 15 years of research in the field, we came to the conclusion that it's not necessary to use superconducting materials in order to modify the gravity field. We use rotating magnetic fields, and we can turn to normal conductors ..." [6].

11 Obviously even E. G. could not reliably produce the same results when repeating his experiment. This seems to be also valid for other groups which tried to replicate his experiment [7].

12 Usually it was assumed that these groups were not successful, because they were not able to prepare superconducting discs, comparable in quality to those of E. G.

13 If one considers point 10 together with point 11 one may think about the possibility, that quite other sources may be responsible for the low reproducibility of E. G.'s experiment.

Altogether one can understand that E. G.'s reports did not find great acceptance from refereed journals, mainly due to low reproducibility of the experimental results, missing theoretical foundation, and incompatibility with classical theories of gravitation.

### 3 Podkletnov's impulse gravity-generator

Besides his above mentioned experiment in Tampere, E. P. performed another one in connection with gravity with an equipment which he described as "Impulse Gravity Generator" [9]. From the abstract the following details may be cited:

"Discharges originating from a superconducting ceramic electrode are accompanied by the emission of radiation which propagates in a focused beam without noticeable attenuation through different materials and exerts a short repulsive force on small movable objects along the propagation axis. Within the measurement error (5 to 7 %) the impulse is proportional to the mass of the objects and independent on their composition. It therefore resembles a gravitational impulse. The observed phenomenon appears to be absolutely new and unprecedented in the

literature. It cannot be understood in the framework of general relativity."

Some other details of this experiment may be mentioned here: The electric currents reached values of about 104 A, the combined magnetic field amounted to about 1 T, and the discharge voltage could be increased to one Million Volts, or even to two times this value, as reported later [10]. The gravitational radiation was so strong that normal pendulums could be used to measure the pulses, coming from the emitter. Measurements of the impulses taken at close distances (3-6 m) from the installation and at the distance of 150 m gave identical results, within the experimental errors. The divergence of the beam of repulsive gravitational forces seems to be extremely low, because their effect could be detected even at distances of 1.2 km or 5 km [11].

### 4 Relevant principles of the ARG

As explained in detail in [3], Axions or ALPs (Axion Like Particles) are generated in suitable "production systems", e.g. the hot interior of stars. The ALPs traverse baryonic matter with almost no interaction. They, however, transform during

their flight away from the center of the stars into gravitons which can transfer their mechanical impulse towards every baryonic matter, exactly proportional to the mass of this matter. Therefore, it was already stated earlier [2], that the primary gravitational interactions are not attractive but repulsive forces. From astronomical observations it was concluded that the typical distance at which the ALPs, emitted from the core of stars, are all converted to gravitons is about .13 pc. Inside the sphere with this radius, however, the conversion rate of ALPs to gravitons can be increased by the catalytic influence of magnetic fields, created by different "magnetic systems".

The importance of "production systems" and "magnetic systems" for the creation of ALPs and their conversion to gravitons was already discussed in [3] in connection with several different phenomena: Chromospheric heating, solar flares, coronal mass ejection, and astrophysical jets. The same two systems and their actions will also play the essential role for the explanation of E. P.'s experiments.

The mutual shielding of two masses  $m^1$  and  $m^2$  of the primary repulsive gravitational forces, produced by all the luminous matter of the universe, leads to a secondary gravitational effect: The attracting forces between  $m^1$  and  $m^2$ , well described by Newton's and Einstein's theories. In this paper, however, not the secondary but only the primary gravitational forces play the essential role.

## 5 ARG-expectation of the tampere-experiments

In the recent update [3] of the ARG it was concluded that the typical distance at which the ALPs, emitted from the core of stars, are all converted to gravitons, is about .13 pc. Thus, the only star from which ALPs can appear on Earth, is our Sun. It may be stated here, that the ARG does not deliver any theoretical basis for the production of ALPs or their conversion to gravitons. Explanations of these processes are objects of High- Energy-Physics or Plasma-Physics. Just from one of such sources [12] three points may be cited. First: Hot plasmas are efficient sources of Axions. Second: The strongest source of Axions, which appear on Earth, is the Sun. Third: The region from where these Axions are emitted corresponds to about 20% of the radius of the Sun.

ALPs emitted from this region and traversing E.P.'s magnetic system belong to a beam with a divergence of  $1.8 \cdot 10^{-3}$  deg in diameter. Due to the density profile of this beam, with the strongest values at the core, the effective divergence may be assumed even smaller than this value. Such values of divergence are well known, however, from Laser systems, but not until now from classical gravitational interactions 4 (superscripts refer to those in chapter 2).

According to the ideas of the ARG a part of the ALPs is converted due to the catalyzing effect of the magnetic system into gravitons, which move with the same divergence into the same direction as the ALPs. The gravitons transfer a part of their impulse to every mass  $m$ , proportional to the value of  $m$ , and thus they produce a beam of repulsive gravitational forces 4 with the above mentioned small divergence. These forces with repulsive nature of course appear only behind the magnetic system. Therefore, one can conclude many different situations:

Late in the evening the ALPs cross the magnetic system from below. The repulsive forces of the gravitons reduce the weight of the mass  $m$ , thus simulating a shielding of gravity. Of course no change of the weight of  $m$  can be expected, if  $m$  is located below the magnetic system 3.

Observations at high Noon, however, would deliver a completely different result. If  $m$  is positioned above the magnetic system, no weight change will be observed. If, however  $m$  is placed between the magnetic system and Earth, its weight seems to be increased 5.

Thus, it becomes plausible why E.G. declares that he could manipulate gravity by decreasing or increasing its value. Due to the ARG, however, even this statement is ambiguous. The attraction of the mass  $m$  towards the Earth, usually described as Earth's gravity, is completely unchanged. And therefore, also the term "gravity shielding" is completely inappropriate. What really produces these unexpected results is the production of additional gravitational forces.

E. P.'s Tampere experiment possesses a low capacity for reproducibility, but an exceptional high possibility to confuse the experimenter, as may be explained by the following hypothetical situation:

After hard working till late in the evening he could successfully retry his experiment, which revealed the weight loss of  $m$  due to the assumed gravity shielding. So he expected with high delight to be able to convince his colleagues and other

observers from his findings. But what really appeared: A disaster. Absolutely no decrease was observed, when the balance measured the weight of  $m$  during the normal working times.

Thus, it appears quite reasonable, that E. P. always stated that the detection of this curious gravitational effect was just by accident 9. But this accident was possible due to two fortunate circumstances: The first observations were performed late in the evening and the smoke served as a excellent sensor to indicate the repulsive beam everywhere above the rotating disk.

The acceptance of E. P.'s new findings by experts, however, was hampered until now by at least two severe problems: The experiments could not be repeated reproducibly 11, 13, and the results really did not fit to classical gravity theories.

## 6 ARG-expectation of the impulse gravity generator

The electromagnetic radiation from the surface of the Sun, with a temperature of about 6000 K, shows its maximum at a photon energy at about 2 eV. At the center of the Sun, with a temperature of about 15 Million deg K, photon energies up to 5000 eV are typically to be expected. If under these conditions ALPs are created inside the Sun, why should they not be created under conditions, where inside the gravity generator accelerating electrical fields are created by discharges with 2 Million Volts. Therefore, from the ARG it is very reasonable to assume that this type of generator can act as a production system for ALPs. The second component, necessary for the local conversion of ALPs, a magnetic system, as discussed above with the Tampere-experiment, also exists in the gravity generator. And because production system and magnetic system exist at the same place, it can be expected that a part of the ALPs is already converted to gravitons inside the equipment, which can be detected directly behind the generator due to their repulsive forces. The small divergence of the beam along the direction of the electrical discharge is well compatible with the expectations of the ARG.

Therefore, on the basis of the ARG, it is expected that future experiments with setups like the "Impulse Gravity Generator" can deliver new and extremely valuable insights into the real sources of gravity.

## 7 Conclusions and corrections

In the conclusions of a foregoing paper <sup>[3]</sup> it was suggested that the application of special magnetic systems, to transform ALPs from the Sun into gravitons, would be highly promising experiments to get completely new insights into the secrets of gravity. This statement seems to be valid until now. But another statement must be corrected: The operator of such new experiments, even if he reveals positive results, will not be the first one who performed successfully such experiments. Already several years ago the Russian physicist Eugene Podkletnov performed experiments, which probably produced repulsive gravitational forces due to the transformation of solar ALPs into gravitons. Just this transformation, and not his mentioned shielding of Earth's gravity, should be seen as the source of the observed changes of the weight of test masses.

Despite the high importance of Podkletnov's early Tampere-experiments, there seems to exist a still more important experiment, the production of mechanical forces by his "Gravity Force Generator". This experiment obviously shows for the first time, that the production of ALPs and gravitons can not only occur in the hot interior of stars, but also on earth in systems which, during a high-voltage discharge, simultaneously create a plasma and magnetic fields at the same place.

Classical theories of gravity, though alive since about 330 (Newton) or just 100 years (Einstein), are well suited to describe the attracting forces between two masses, but they seem not to be able to explain Podkletnov's experiments.

On the basis of the ARG, E. G.'s experiments deal with primary gravitational effects, the production of repulsive gravitational forces. The attractive gravitational forces between two masses, as described very well by Newton and Einstein, are seen as secondary effect. Temporal changes of these attractive gravitational forces should be seen as effects of third rank.

On this basis, especially "gravitational waves", which were predicted already long ago by Einstein, may be seen as such an effect of third rank.

Since Weber's experiments in the 1960's until an announcement in 2015 <sup>[13]</sup>, there have been several not very convincing reports about the detection of gravitational waves. But just recently the LIGO collaboration definitely states the detection of this effect. At the moment it is quite commonly assumed that this observation will be honored by the Nobel Prize in Physics. The last uncertainties may at least be destroyed when after the start of LISA in 2034 the last doubts can be cleared.

On the basis of the ARG, however, it would be highly promising, if some resources, small and negligible compared to

those planned for the investigation of third rank effects like "gravitational waves", could be invested already in the next future into research connected with the primary, repulsive effects of gravity, as revealed by E. P.'s experiments.

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